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# CHANGES IN DEER HUNTING PARTICIPATION AND HARVEST RELATED TO HUNTER'S AGE

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## ABSTRACT

*This survey was done to investigate the relationship between hunter's age and deer harvest in Michigan and to use this relationship to predict the number of deer harvested in Michigan during 2005-2020. Mean number of deer harvested per hunter in 2002 was highest among hunters 25-44 years of age. On average, hunters gradually harvested fewer deer after they reached 45 years of age. Harvest appeared to decline largely because older hunters spent fewer days hunting rather than because they were less efficient while hunting. Older hunters primarily hunted during the regular firearm hunting season. The number of people actually going afield to hunt deer is projected to increase 3.7% between 2005 and 2020. The number of deer harvested (all sexes combined) is projected to increase 2.3%, and antlerless deer harvest is projected to increase 2.0%. Although hunter numbers are expected to increase, the proportion of Michigan residents (≥10 years old) hunting is projected to decline from 8.7% to 8.5%. Human demographic trends indicate that the mean age of hunters will be increasing, signifying a larger proportion of older deer hunters. Because older hunters generally harvest fewer deer than younger hunters, deer harvest is projected to increase at a rate slower than the projected growth of Michigan residents. Moreover, the harvest of antlerless deer is expected to increase at a slower pace than the increase in hunter numbers. Antlerless harvest rates may lag behind the harvest of antlered deer primarily because older hunters are less likely to harvest antlerless deer than younger hunters.*

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## INTRODUCTION

In Michigan, deer hunting participation by older hunters has increased since the 1970s (Figure 1, Frawley 2004). Nationally, older hunters generally spend fewer days afield hunting than younger hunters (Aiken 2004). In New York, older deer hunters also were less likely to harvest deer than younger hunters (Brown et al. 2000, Lauber and Brown 2000). Despite the increased participation by older hunters in Michigan, deer population goals may be harder to achieve if Michigan hunters are similar to New York hunters and are less likely to harvest deer, particularly antlerless deer. Consequently, the primary goal of this study was to determine the relationship between hunter's age, hunting participation, and harvest of deer in Michigan. The secondary goal was to use these relationships and human demographic trends to predict the number of deer hunters and the number of deer harvested in Michigan during 2005-2020.

## METHODS

Hunters in Michigan had to be at least 14 years old before they could purchase a firearm deer hunting license, although 12-13 year old hunters could purchase licenses to hunt deer with archery equipment. The Michigan Department of Natural Resources (DNR) currently sells hunting licenses using a statewide automated license sales system (i.e., Retail Sales System). This system allowed the DNR to maintain a database containing license sales information (e.g., sales transactions and customer profiles). From this database, the birth date and state of residence were determined from nearly every license buyer.

Deer harvest was estimated from hunting activity reports provided by a random sample of deer hunters (Frawley 2003). Following the 2002 deer hunting seasons, a questionnaire was sent to 52,589 randomly selected individuals that had purchased a hunting license (firearm, archery, antlerless, or combination deer hunting licenses). Hunters receiving the questionnaire were asked to report which seasons they pursued deer, number of days spent afield, and number of deer harvested.

Estimates from the sample were extrapolated to all license buyers. Because these estimates were based on information collected from random samples of hunting license buyers, they were subject to sampling errors (Cochran 1977). Estimates were calculated using a stratified random sampling design and were presented along with their 95% confidence limit (CL). In theory, this confidence limit can be added and subtracted from the estimate to calculate the 95% confidence interval. The confidence interval is a measure of the precision associated with the estimate and implies that the true value would be within this interval 95 times out of 100. Unfortunately, there are several other possible sources of error in surveys that are probably more serious than theoretical calculations of sampling error. They include failure of participants to provide answers (nonresponse bias), question wording, and question order. It is very difficult to measure these biases; thus, estimates were not adjusted for these possible biases.

Human population projections summarized by age and sex for 2005-2020 were obtained from Michigan State University, Program for Applied Demography and Ecology (http://pade.msu.edu/). These projections were used in combination with hunter participation rates in 2002 that were also summarized by age and sex to predict the number of hunters (i.e., people actually going afield to hunt) during 2005-2020. These projections of hunter

numbers were used in combination with the 2002 hunter success estimates (mean harvest per active hunter) to project the number of deer harvested by Michigan residents (≥10 yeas old) during 2005-2020. These projections assumed that only the number of Michigan residents changed over time, all other factors affecting deer harvest were assumed constant (e.g., deer numbers, antlerless deer license quotas, access to private lands for hunting, the extent of urbanization, and sociological dimensions such as hunter recruitment, retention, and attrition).

## RESULTS

In 2002, 788,271 people purchased a license to hunt deer in Michigan. The average age of these license buyers was 41 years (Figure 2). License buyers purchased an average of 2.3 harvest tags. On average, hunters that were 35-45 years of age purchased the greatest number of harvest tags (Figure 3). The mean number of antlerless harvest tags purchased by hunters varied little among age classes (Figure 3), although hunters who were less than 30 years of age and hunters greater than 65 years of age were slightly less likely to purchase antlerless tags than hunters 30-65 years old (Figure 4).

About 66% of the deer harvested in 2002 were taken by hunters who were 27-55 years of age, and about 95% of the deer were taken by hunters who were 14-68 years old (Figure 5). Hunters between the ages of 25 and 45 appeared most successful at taking a deer (sexes combined), as well as taking an antlerless deer (Figures 6 and 7).

Mean number of deer harvested per hunter was highest among hunters 25-44 years of age (Figure 8). Beginning with hunters 45-49 years of age, the average number of deer harvested by each age group declined (Figure 8). Mean harvest declined primarily because these older hunters spent fewer days hunting than younger hunters (Figure 9). Older hunters spent fewer days hunting because many restricted their hunting primarily to the regular firearm hunting season (Figure 10) and did not participate in the archery and muzzleloader hunting seasons.

Although older hunters spent fewer days hunting deer, their efficiency while hunting was similar to younger hunters (Figure 11). Thus, their contribution to the harvest appeared to decline largely because there were fewer older hunters and they spent fewer days hunting rather than because they were less efficient at harvesting a deer while afield.

The number of Michigan residents (≥10 years old) is projected to increase 5.4% from 8.6 million to nearly 9.1 million between 2005 and 2020 (Figure 12). Different rates of change are projected among age classes (Figure 13). The youngest age classes will experience declines, while the oldest age classes will experience increases.

The number of people hunting deer is projected to increase 3.7% from 745,000 to about 772,000 hunters between 2005 and 2020 (Figure 14). Although hunter numbers are expected to increase marginally between 2005 and 2020, the proportion of Michigan residents hunting (i.e., people actually going afield to hunt) is projected to decline from 8.7% to 8.5%.

As noted among the population of Michigan as a whole, the population of deer hunters will increase disproportionally among age classes (Figure 15). The proportion of hunters in the youngest age classes will experience declines, but assuming aging hunters are retained at

historic rates, the oldest age classes will experience increases. Concurrently, the mean age of deer hunters is expected to increase from 41 to 43 years of age between 2005 and 2020.

The projected number of deer harvested (all sexes combined) is projected to increase 2.3% between 2005 and 2020, and antlerless deer harvest is projected to increase 2% (Figure 16). During this period, a disproportionally greater number of deer are projected to be harvested by the oldest hunters (Figures 17 and 18). The number of deer harvested by hunters in the youngest age groups is expected to decline between 2005 and 2020.

## DISCUSSION

Deer hunter and harvest projections for 2005-2020 were estimated assuming that the proportion of people hunting and their hunting success remained the same as estimated in 2002 (Frawley 2003). All other factors affecting deer harvest were assumed constant (e.g., deer numbers, antlerless deer license quotas, access to private lands for hunting, the extent of urbanization, and sociological dimensions such as hunter recruitment, retention, and attrition). In reality, these factors are unlikely to remain constant; however, it is difficult to predict how these factors may change. Despite these problems, the projections may be useful for investigating the role of changing human demographics assuming all other factors are held constant.

National demographic trends indicate that the mean age of Americans will be increasing, signifying a larger proportion of older Americans. Concurrently, the mean age of deer hunters is expected to increase, and an increasing proportion of deer hunters will be older than 55 years of age.

Older hunters generally harvest fewer deer and spend fewer days hunting deer than younger hunters. Moreover, older hunters generally hunt during fewer seasons, tending to concentrate their hunting effort during the regular firearm season. Thus, deer harvest is projected to increase at a rate slower than projected growth of the resident population of Michigan. Moreover, the harvest of antlerless deer is expected to increase at a slower pace than the increase in hunter numbers. Antlerless harvest rates will lag behind the harvest of antlered deer primarily because older hunters are less likely to harvest antlerless deer than younger hunters.

Most wildlife management agencies assume that traditional recreational hunting can be effective in controlling deer numbers, although this has never been thoroughly tested over large areas and extended periods of time (Brown et al. 2000). Between 1960 and 2002, the deer population increased by 2.5 times in Michigan, but hunter numbers increased by only 1.6 times. During this same period, wildlife agencies have placed increased emphasis on harvesting antlerless deer to control deer numbers (Brown et al. 2000). In Michigan, the annual harvest of antlered deer has increased five-fold, while harvest of antlerless deer has increased eight-fold between 1960 and 2002. Although harvest of antlerless deer has increased, only 52% of deer license buyers purchased at least one antlerless license in 2002 (Frawley 2003). Thus, controlling deer numbers with hunting has become more difficult and complex (e.g., additional seasons and harvest restrictions) despite increasing hunter numbers and liberalized harvests of antlerless deer (Brown et al. 2000). Given that hunter numbers are not projected to change significantly during the foreseeable future, controlling deer populations

will become increasingly difficult. The DNR may need to consider additional strategies to increase harvest of antlerless deer (Brown et al. 2000, Riley et al 2003).

## ACKNOWLEDGEMENTS

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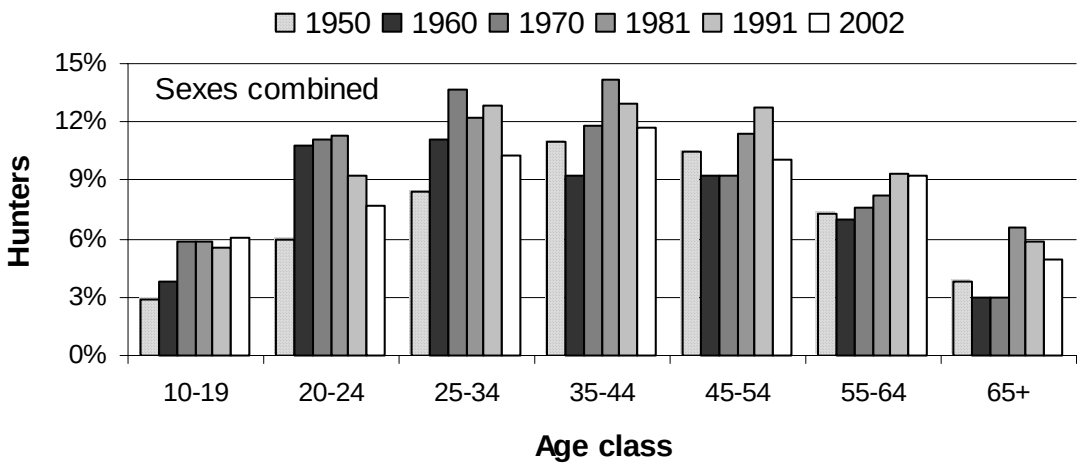


Figure 1. Proportion of Michigan residents that hunted deer by sexes and age, 1950-2002 (Frawley 2004).

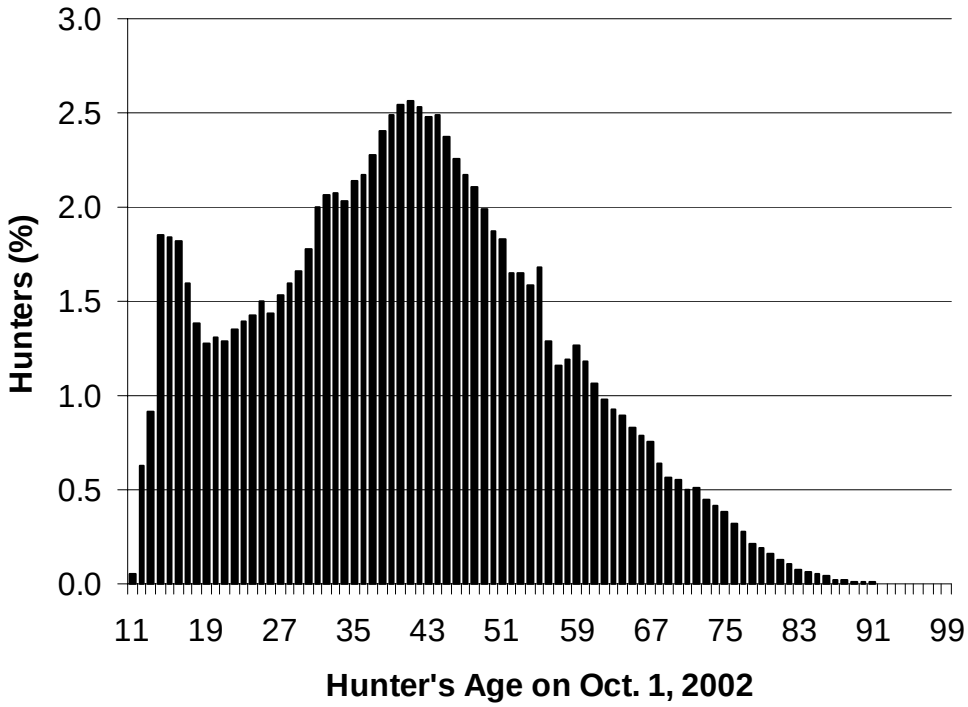


Figure 2. Age of people that purchased a deer hunting license in Michigan for the 2002 hunting seasons ($\bar{x}$ = 41 years). Licenses were purchased by 788,271 people.

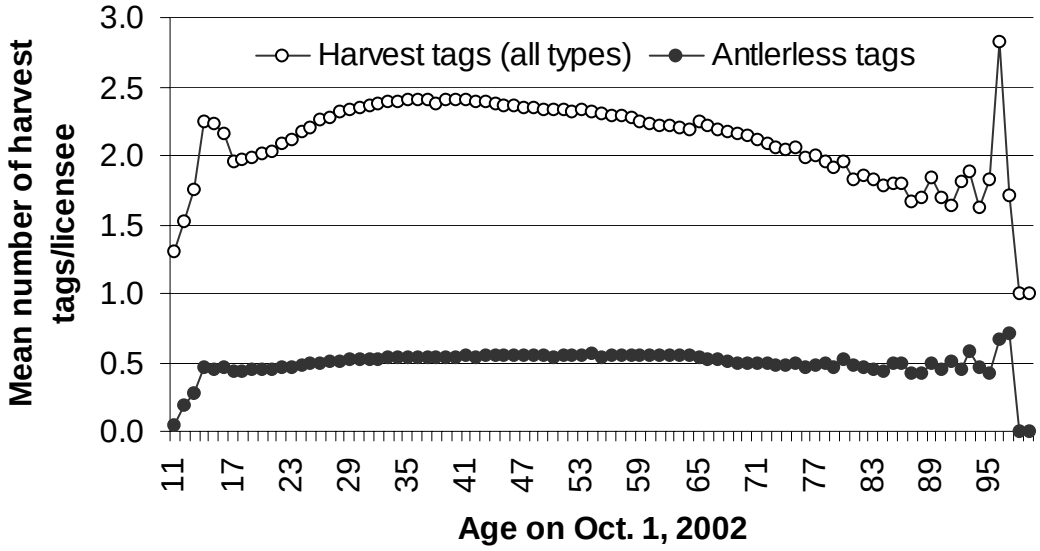


Figure 3. Mean number of harvest tags and antlerless harvest tags purchased by licensees in Michigan during 2002, summarized by age.

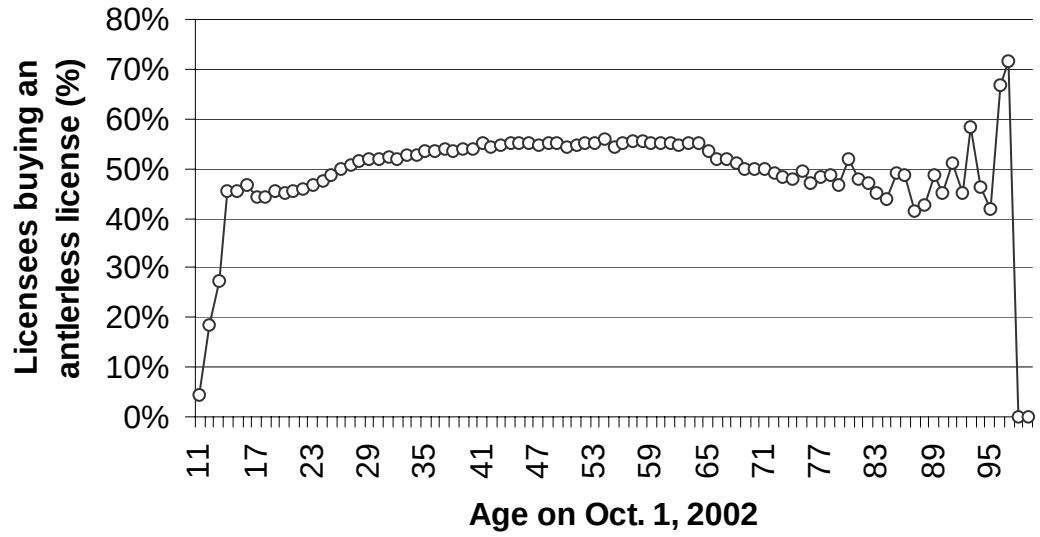


Figure 4. The proportion of deer hunters that purchased an antlerless deer hunting license in Michigan during 2002, summarized by age.

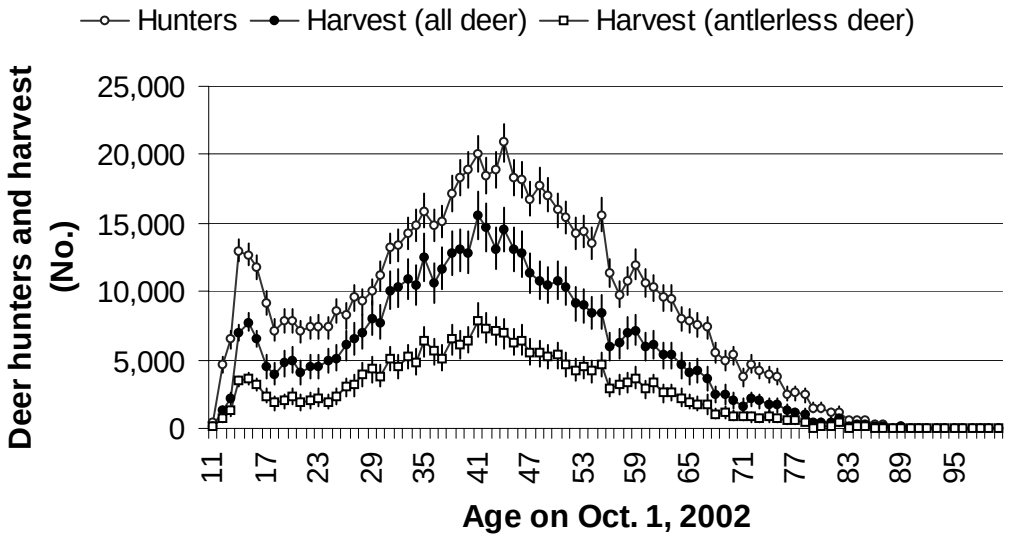


Figure 5. Estimated number of deer hunters and deer harvest in Michigan during 2002 (all seasons combined), summarized by age. Vertical bars represent the 95% CL.

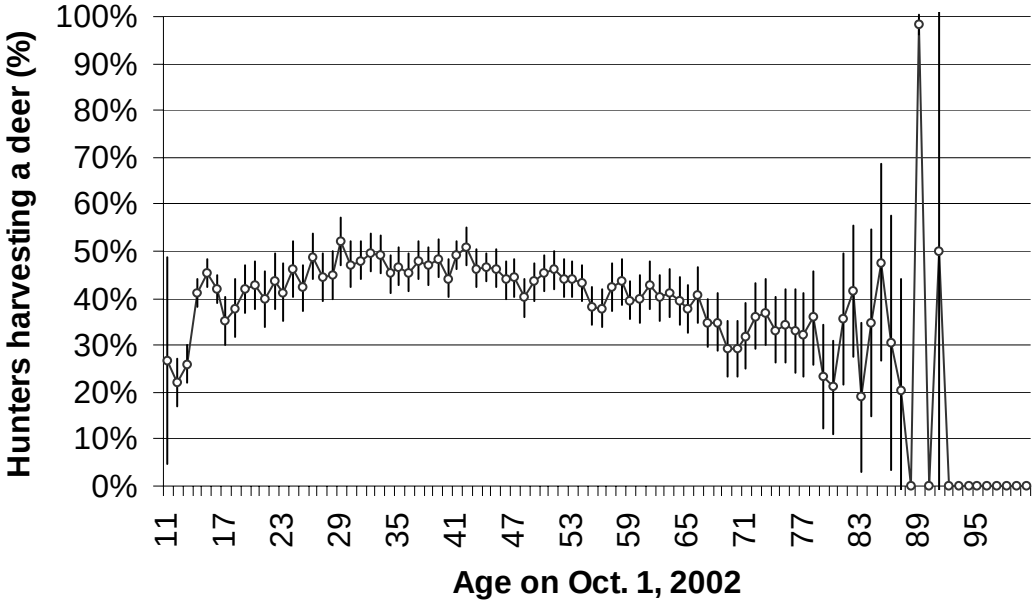


Figure 6. Estimated proportion of hunters harvesting a deer in Michigan during 2002 (all seasons combined), summarized by age. Vertical bars represent the 95% CL.

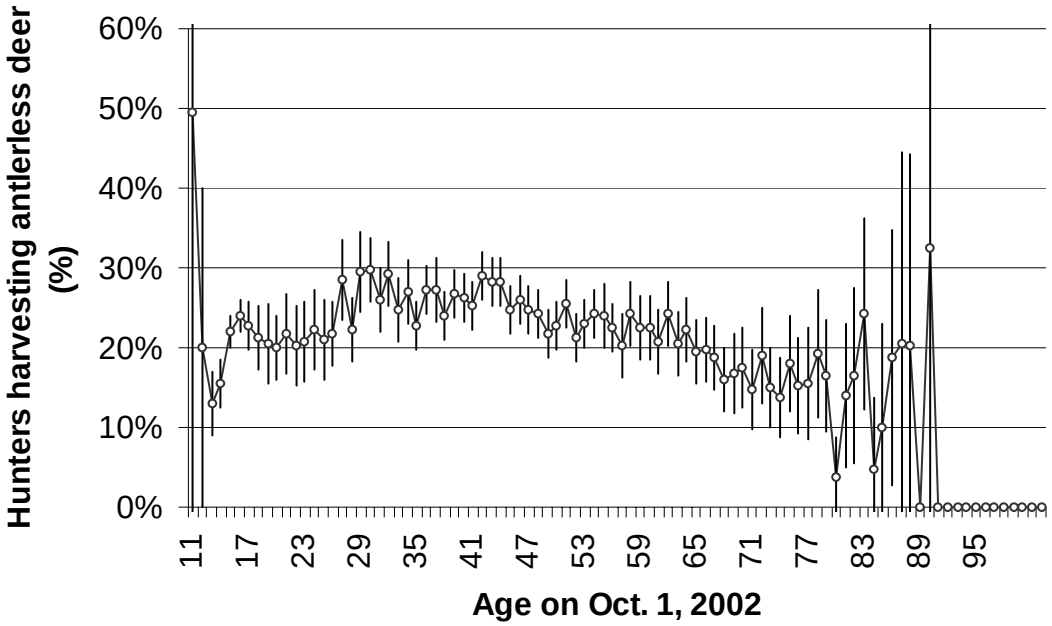


Figure 7. Estimated proportion of hunters harvesting an antlerless deer in Michigan during 2002 (all seasons combined), summarized by age. Vertical bars represent the 95% CL.

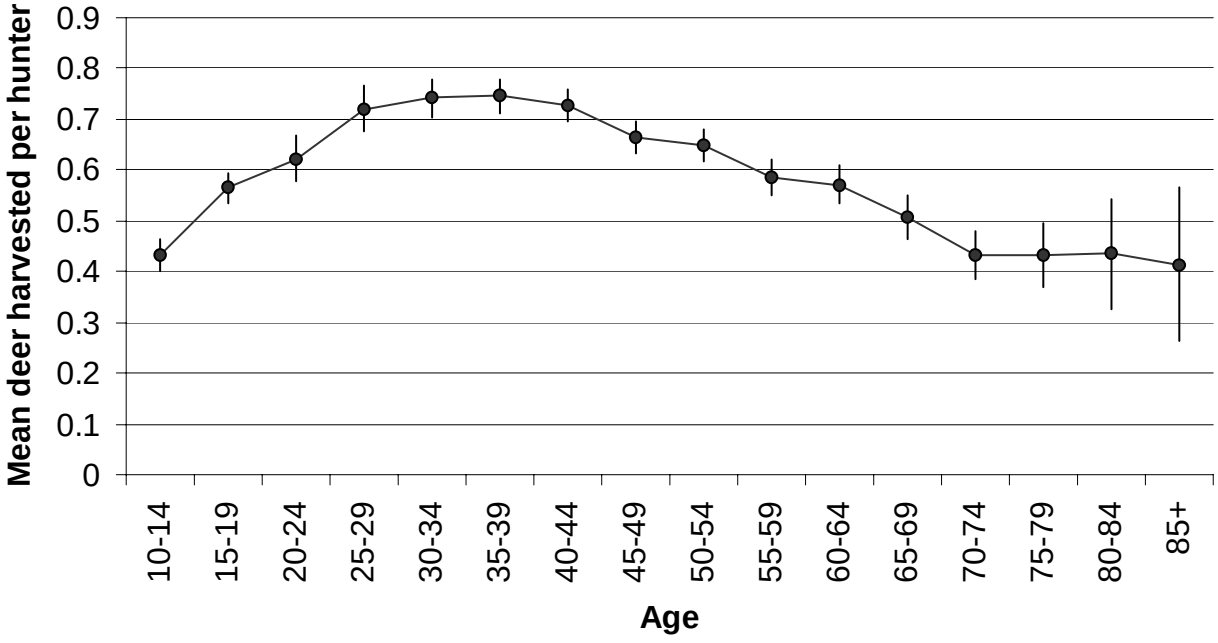


Figure 8. Estimated mean number of deer harvested per hunter in Michigan during 2002 (all seasons combined), summarized by 5-year age class. Vertical bars represent the 95% CL.

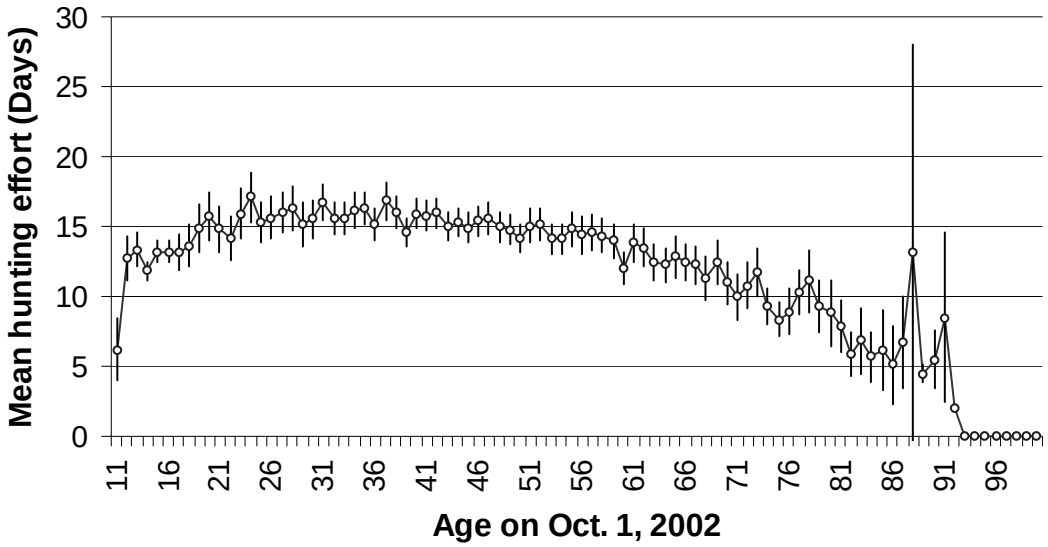


Figure 9. Estimated mean hunting effort (days/hunter) by deer hunters in Michigan during 2002 (all seasons combined), summarized by age. Vertical bars represent the 95% CL.

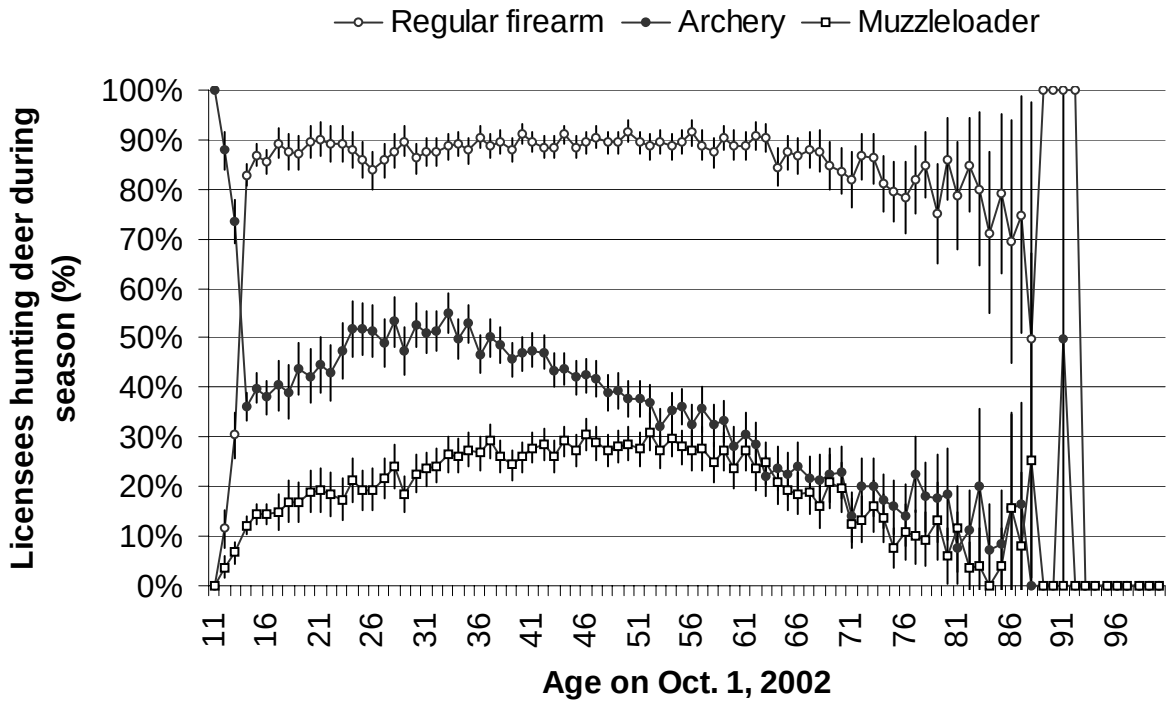


Figure 10. Proportion of license buyers that hunted deer during the regular firearm, archery and muzzleloader seasons in Michigan during 2002, summarized by age. Vertical bars represent the 95% CL.

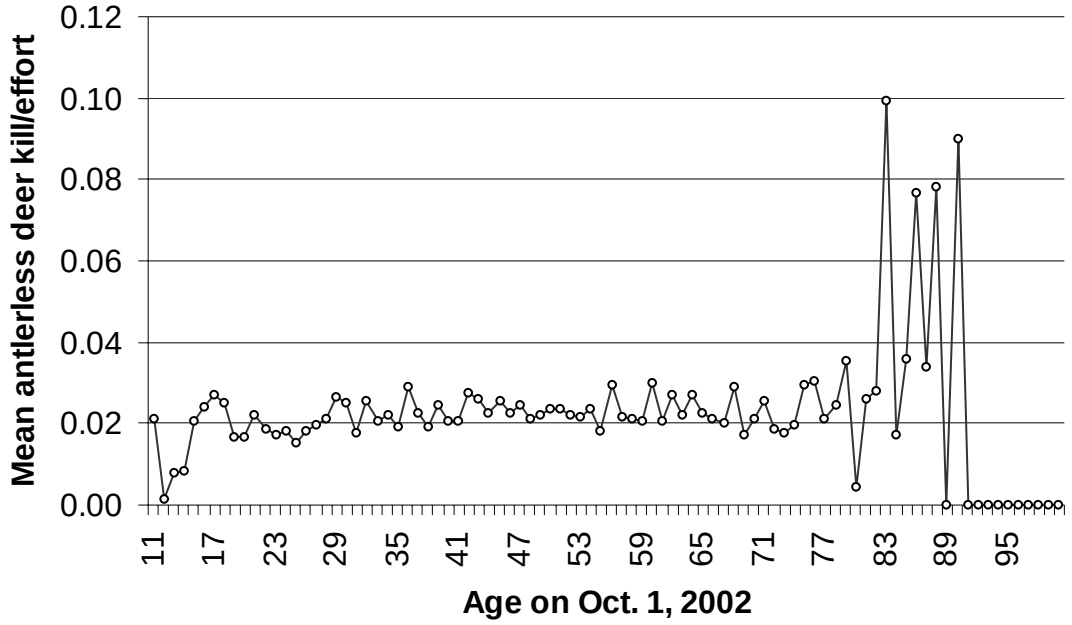


Figure 11. Estimated number of antlerless deer harvested per hunting effort (day) in Michigan during 2002 (all seasons combined), summarized by age.

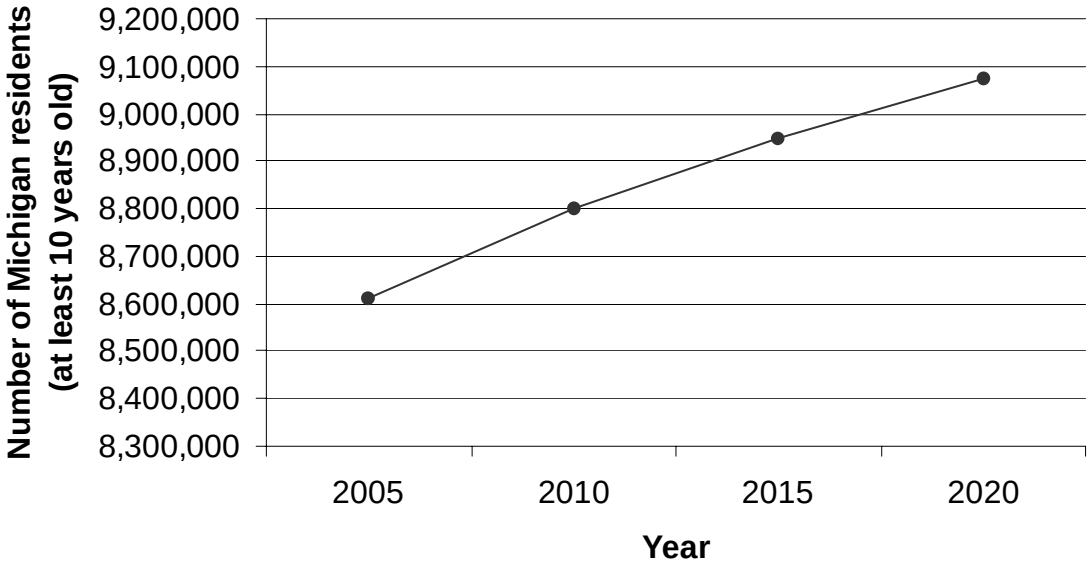


Figure 12. Predicted number of Michigan residents, at least 10 years old, 2005-2020 (Michigan State University, Program for Applied Demography and Ecology, http://pade.msu.edu/).

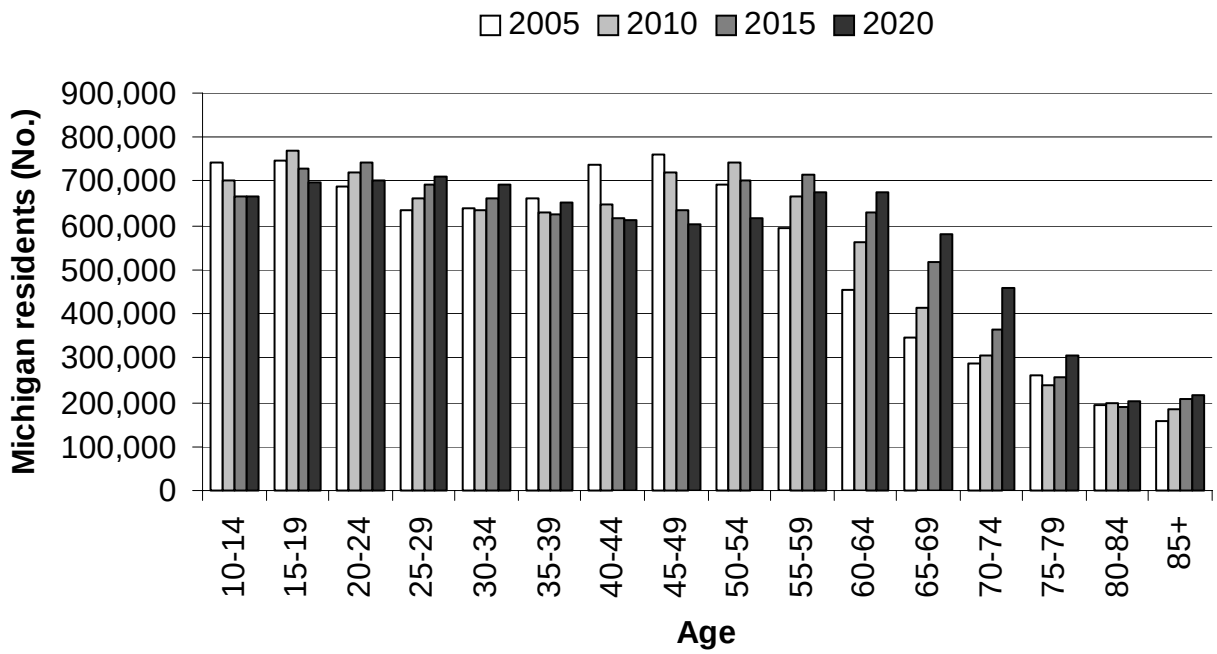


Figure 13. Predicted number of Michigan residents, summarized by 5-year age classes, 2005-2020 (Michigan State University, Program for Applied Demography and Ecology, http://pade.msu.edu/).

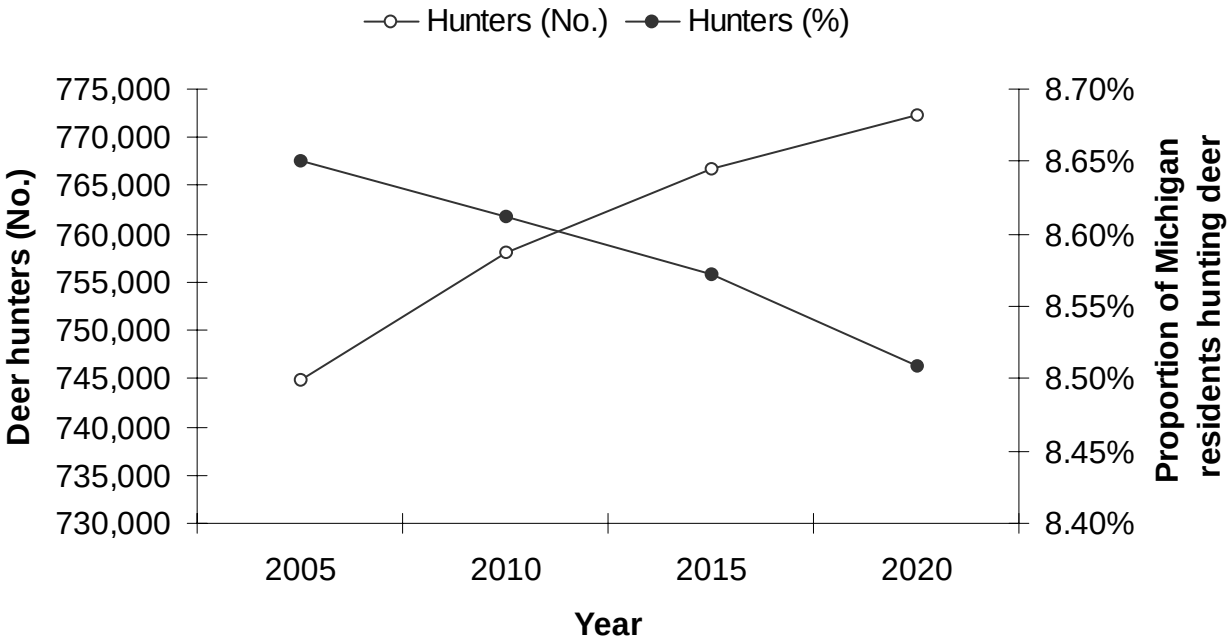


Figure 14. Predicted number of resident deer hunters in Michigan and the proportion of Michigan residents (≥10 years old) hunting deer, 2005-2020.

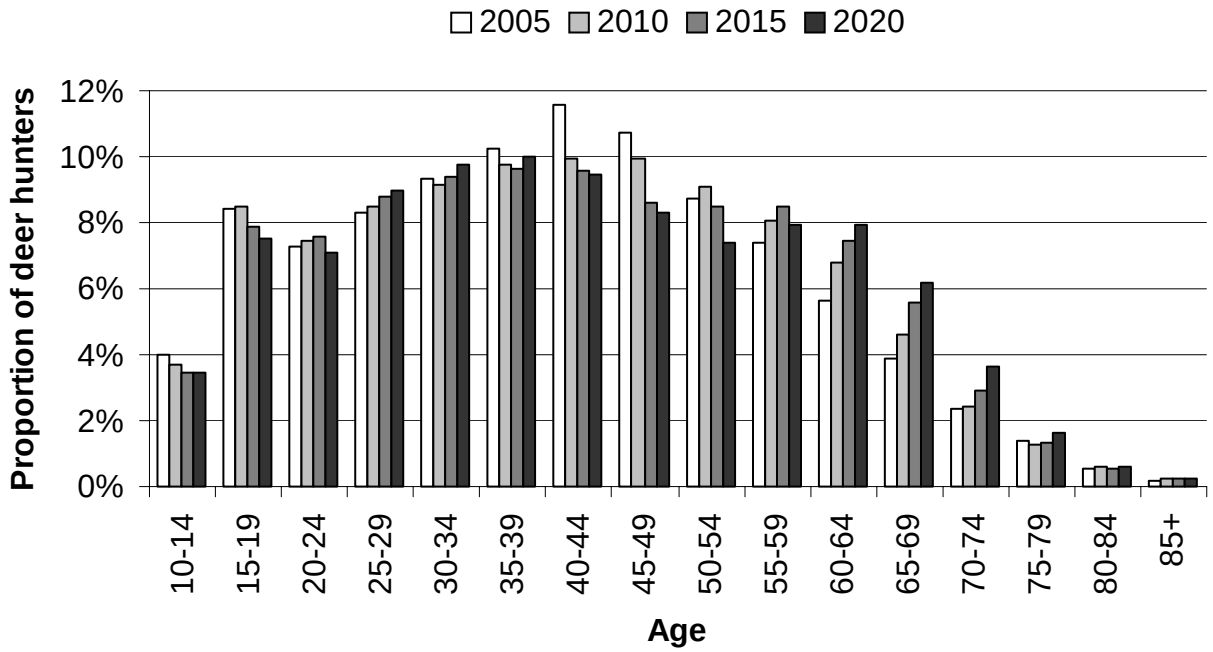


Figure 15. Proportion of deer hunters within each age class, 2005-2020.

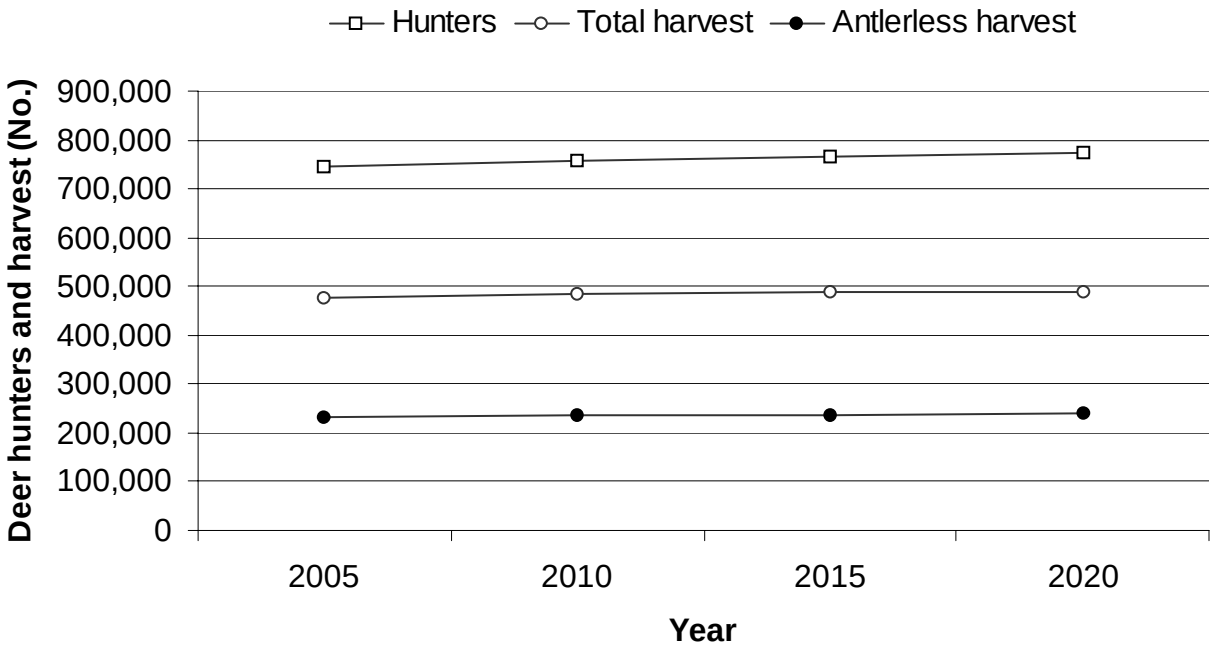


Figure 16. Predicted number of deer hunters and harvest in Michigan during 2005-2020.

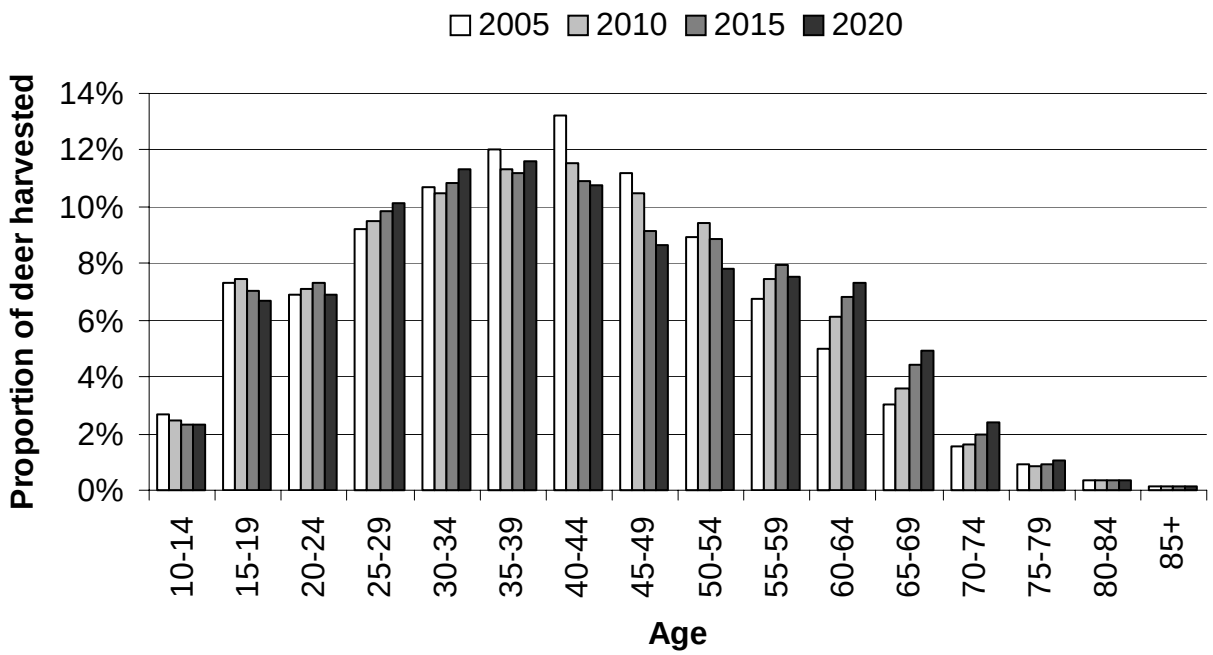


Figure 17. Proportion of the predicted deer harvest in Michigan taken by hunters within each 5-year age class, 2005-2020.

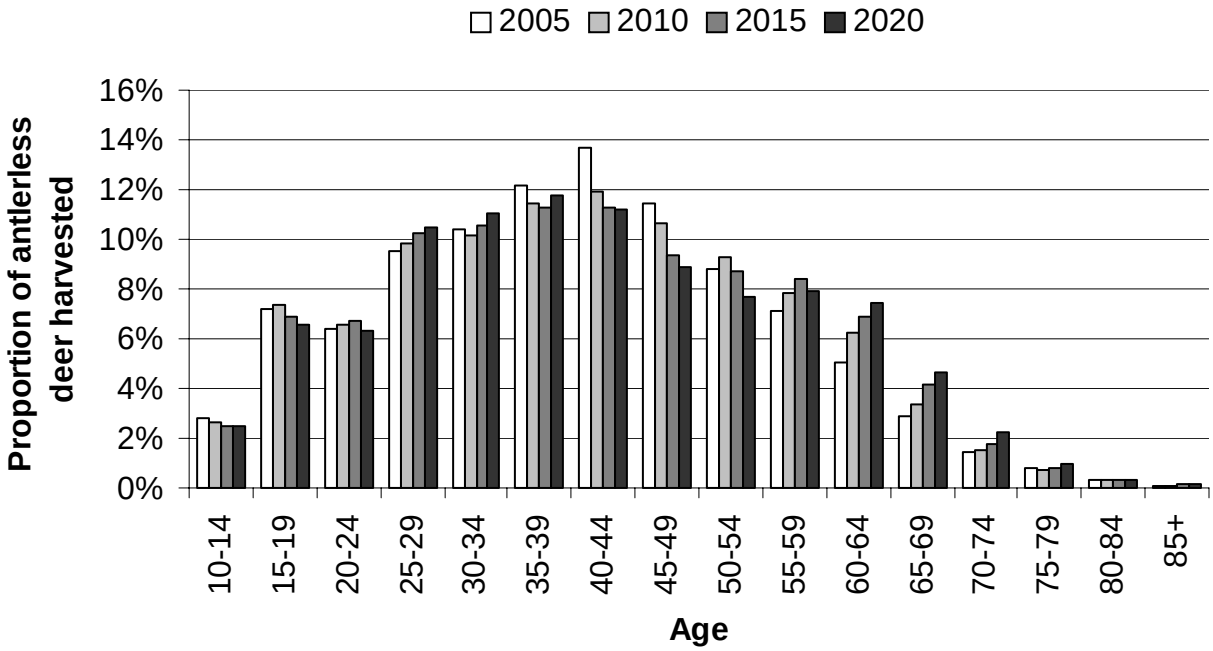


Figure 18. Proportion of the predicted antlerless deer harvest in Michigan taken by hunters within each 5-year age class, 2005-2020.